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PATENT SPECIFICATION

759,137

Inventors:—FREDERICK EDWARD DEANS and CARLYLE HERBERT WAINWRIGHT.



Date of filing Complete Specification : April 7, 1953.

Application Date : April 7, 1952. No. 8790/52.

Complete Specification Published : Oct. 17, 1956.

Index at Acceptance :—Class 74(2), C1A12.

COMPLETE SPECIFICATION.

SPECIFICATION NO. 759,137

INVENTORS: FREDERICK EDWARD DEANS and CARLYLE HERBERT WAINWRIGHT

By a direction given under Section 17(1) of the Patents Act 1949 this application proceeded in the name of The Bentley Engineering Company Limited, a British company, of Komet Works, New Bridge Street, Leicester.

THE PATENT OFFICE,
25th October, 1956

DB 39555/1(5)/3608 100 10/56 R

- 15 inside the needle cylinder, and sinker operating cams inside the sinker ring. The invention is primarily concerned with machines of this type having two opposed needle cylinders equipped with double ended needles
20 capable of being transferred from one cylinder to the other by means of sliders for the purpose of changing over from the production of rib fabric to plain fabric and for the purpose of altering the character of the rib fabric.
25 In general such machines have cylinders disposed one above the other to rotate and oscillate about a common vertical axis, and those machines which are sold under the Registered Trade Mark "KOMET" are an example to which this invention is applicable.

In superimposed needle cylinder machines of the type specified the sinkers are usually carried in a grooved or tricked ring so as to be capable of projection between the needles to the outside of the needle circle to engage the yarn and of retraction to draw the yarn inwardly so as to assist in the loop formation and so as to hold down the loops as the needles rise. The cams necessary to give the sinkers their movement, and the sinker ring, are usually mounted on a sleeve which extends downwards through the bottom

cylinder the sleeve is positioned by one stop, and as the needle cylinder reverses its direction of movement during "reciprocating" knitting the sleeve is moved over from one stop to the other. The sinker cams are keyed to the sleeve and the sinker ring is keyed to the needle cylinder so that the sinkers are carried around the stationary sinker cams. Usually two plain journal bearings are provided between the rotatable and oscillatable needle cylinder and the relatively stationary sleeve, one just below the sinker ring and one near the lower end of the needle cylinder. These serve to hold the sleeve concentrically with the needle cylinder and for many years have been a source of trouble in knitting machines of the type under discussion because they are difficult to lubricate. In particular the lower bearing is liable to become dry and in some cases rusty and if this happens seizure occurs.

A number of proposals have been made for overcoming this difficulty and some of them have been concerned with manual or automatic lubricating devices for the bearings. Because of the extreme inaccessibility of the bearings such lubrication systems have not achieved practical success. Other pro-

[Price 3s. 0d.]

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COMPLETE SPECIFICATION.

Improvements in Circular Knitting Machines.

We, THE BENTLEY ENGINEERING COMPANY LIMITED, of Komet Works, New Bridge Street, Leicester, a British Company, do hereby declare this invention, for which we

5 pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns circular knitting machines of the type (hereinafter referred as "the type specified") having a rotatable and oscillatable needle cylinder, inside sinkers (i.e. sinkers mounted and controlled inside the needle circle) mounted in a sinker ring 10 inside the needle cylinder, and sinker operating cams inside the sinker ring. The invention is primarily concerned with machines of this type having two opposed needle cylinders equipped with double ended needles capable of being transferred from one cylinder to the other by means of sliders for the purpose of changing over from the production of rib fabric to plain fabric and for the purpose of altering the character of the rib 15 fabric. In general such machines have cylinders disposed one above the other to rotate and oscillate about a common vertical axis, and those machines which are sold under the Registered Trade Mark "KOMET" 20 are an example to which this invention is applicable.

In superimposed needle cylinder machines of the type specified the sinkers are usually carried in a grooved or tricked ring so as to be capable of projection between the needles to the outside of the needle circle to engage the yarn and of retraction to draw the yarn 25 inwardly so as to assist in the loop formation and so as to hold down the loops as the needles rise. The cams necessary to give the sinkers their movement, and the sinker ring, are usually mounted on a sleeve which extends downwards through the bottom

needle cylinder and rests on a fixed part of the machine below the needle cylinder and the cylinder-driving mechanism. 45

Mechanism is usually provided on a fixed part for adjusting the sleeve vertically so that the height of the sinkers may be set to a nicety. The fixed part also usually carries stop mechanisms for locating the sleeve circumferentially in relation to the needle cams and for adjusting the timing of the sinker movements in relation to the needle movements. This mechanism usually incorporates two opposed stops between which a suitable part on the sleeve is disposed so that during rotation of the needle cylinder the sleeve is positioned by one stop, and as the needle cylinder reverses its direction of movement during "reciprocating" knitting the sleeve is moved over from one stop to the other. The sinker cams are keyed to the sleeve and the sinker ring is keyed to the needle cylinder so that the sinkers are carried around the stationary sinker cams. Usually two plain journal bearings are provided between the rotatable and oscillatable needle cylinder and the relatively stationary sleeve, one just below the sinker ring and one near the lower end of the needle cylinder. These serve to hold the sleeve concentrically with the needle cylinder and for many years have been a source of trouble in knitting machines of the type under discussion because they are difficult to lubricate. In particular the lower bearing is liable to become dry and in some cases rusty and if this happens seizure occurs. 50

A number of proposals have been made for overcoming this difficulty and some of them have been concerned with manual or automatic lubricating devices for the bearings. Because of the extreme inaccessibility of the bearings such lubrication systems have not achieved practical success. Other pro- 55

[Price 3s. 0d.]

posals have involved the use of anti-friction bearings such as ball or roller bearings, requiring no lubrication over a long period. A disadvantage of such proposals is that owing to the very restricted space available to accommodate a bearing of this kind the section of the bearing is necessarily very small in relation to its diameter so that the bearings have had to be specially made and are extremely fragile.

The present invention seeks to overcome difficulties discussed above and it provides a circular knitting machine of the type specified, characterised by the combination of a sleeve which at one end is mounted in fixed and concentric relation to the sinker cams and is rotationally supported in relation to the needle cylinder and sinker ring by bearing means confined to that end portion of the needle cylinder at which the sinker cams are located (for example, by a bearing in the sinker ring), which sleeve extends within the cylinder from the cams to beyond the end of the cylinder remote from the sinker ring, centralising means beyond said end of the cylinder in a stationary part of the machine for centralising the sleeve relatively to the needle cylinder and mechanism beyond said end of the cylinder for controlling the angular relationship (about the cylinder axis) of the sleeve and the sinker cams to the needle cams and for permitting and determining limited rotational movement of the sleeve and cams in relation to the needle cams as the cylinder reverses its direction of rotation. It will therefore be seen that there is only one bearing directly between the sleeve and cylinder, viz. a bearing in or immediately adjacent to the sinker ring. This bearing, being disposed in the vicinity of the open end of the needle cylinder, can readily be lubricated. The centralising means does not serve as a bearing in the normally accepted sense of that word, for relative movement between the sleeve and this centralising means only takes place at the time that the needle cylinder reverses its swing during reciprocating knitting.

The centralising means is preferably constituted by a centralising aperture, through which the sleeve extends, in a stationary member disposed beyond that end of the needle cylinder which is remote from the sinker ring.

The foregoing and other features of the invention set out in the appended claims are incorporated in the constructions which will now be described by way of example with reference to the drawings (Figures 1 to 4) filed with the Provisional Specification and the accompanying additional drawing (Figure 5) in which:—

Figure 1 is a sectional elevation through the relevant parts of knitting machine:

Figure 2 is the elevation thereof looking from the left of Figure 1;

Figure 3 is an underneath view of the needle cylinder and associated parts;

Figure 4 is a perspective view of one part of the mechanism; and

Figure 5 is a view corresponding to Figure 1 but illustrating a modified construction.

In Figure 1 there is shown a needle cylinder 1, attached to a base 2 rotatably mounted by means of a thrust bearing 3 and a journal bearing 4 in a stationary part 5 of the frame of the knitting machine. This cylinder 1 may be the lower cylinder of a superimposed needle cylinder machine. It is driven in the usual manner by means of a bevel gear 6 attached to the base 2 and meshing with a bevel gear 7. Inside the top end of the needle cylinder 1 there is a sinker ring 8 which is keyed to it at 9 for up and down adjustment and has its inner periphery of part-circular sectional form. This sinker ring 8 is cut with part-circular tracks 10 in which curved inside sinkers 11 of known form slide, and the sinkers are operated by cams in a cam ring 12, the said cams providing a track 13 for the sinker butts 14.

The cam ring 12 is attached to a throat ring 29 and has a bearing on the internal periphery of the sinker ring 8, its exterior periphery being of part-circular sectional form to match the shape of the sinker ring. The cams are prevented from rotating with the needle cylinder 1 (except for shogging) by the following mechanism. Secured to the cam ring 12 there is a sleeve 15 which extends down inside the needle cylinder 1 and is spaced from it. The lower end of this sleeve 15 protrudes through a suitable aperture in a stationary member 16 attached to the part 5 so that the sleeve is centralised, and this member 16 carries lugs 17, 18, see also Figures 2 and 3, provided with opposed adjustable stop screws 19, 20, between which a parallel sided tongue 21 on the sleeve is disposed. The tongue 21 is provided by forming a recess each side of it in the lower end portion of the sleeve 15. It will therefore be appreciated that during rotation of the needle cylinder 1, the tongue 21 is positioned by one of the stop screws 19, 20 so that the angular relationship of the sleeve 15 and thus of the sinker cam ring 12 to the needle cams is determined. This relationship determines the timing of the sinker movements in relation to the needle movements and it may be adjusted by adjusting the stop screw just mentioned. During reciprocatory knitting the needle cylinder oscillates to and fro. At each reversal of motion of the needle cylinder, the drag between the sinker ring 8 and the sinker cam ring 12 and also the drag exercised on the sinker cams by the sinker butts 14, tends to cause the sleeve 15 to move with the cylinder.

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The slight drag between the stationary centralising part 16 and the base of the sleeve 15 does not prevent this movement of the sleeve 15, which movement is terminated by 5 one of the stop screws 19, 20. Thus throughout reciprocating knitting the tongue 21 moves to and fro or "shogs" between the screws 19, 20.

The sleeve 15 may be suspended from the 10 sinker cam ring 12 in any suitable manner. In the illustrated construction an internal flange 22 at its upper end is locked between said cams and an inner clamping sleeve 23 which is screwed on to the lower end of the 15 throat ring 29. This inner sleeve 23 is itself locked against unscrewing by grub screws 24, shown in Figure 3, screwed into the sleeve 15 and adapted to be tightened against the inner sleeve 23. The latter extends below the sleeve 15 and is formed with pairs of diametrically aligned holes 32 for the reception of a tommy bar to facilitate screwing and unscrewing the inner sleeve.

The sinker ring 8 together with the sinkers 25 11, sinker cam ring 12 and sleeves 15 and 23 is adjustable up and down the needle cylinder 1 in order to regulate the height of the sinkers in relation to the top end of the needle cylinder. For this purpose the 30 sinker ring 8 is supported on the top end of a sleeve 25 slidably mounted in the needle cylinder 1 and driven to rotate with it by means of a tongue 26 (Figures 1 and 4) which fits like a key in a slot 27 in the 35 needle cylinder. This tongue 26 rests on an adjustable screw 28 which extends up through the cylinder base 2 and is provided with a lock nut 31.

Figure 5 illustrates an alternative construction wherein the sleeve 25 has no offset tongue such as 26 and is mounted to rotate with the needle cylinder simply by means of the friction between it and the cylinder supplemented by that between it and a 45 headed locating screw 28. It will be noted that the latter supports the weight of the sleeve 25, sinker ring 8, throat ring 29 and parts carried thereby. The screw 28 extends through and engages with a screw threaded 50 aperture in a part of the cylinder base 2 and its enlarged head engages the lower edge of the sleeve 25. Thus by turning the screw 28 the heightwise adjustment of the sinkers 11 relatively to the needle cylinder 55 1 may be varied. A lock nut 31 is provided to retain the screw 28 in adjusted position. To provide clearance between the head of the screw 28 and the needle cylinder the adjacent portion of the latter is slotted as indicated at 30.

What we claim is:—

1. A circular knitting machine of the type specified, characterised by the combination of a sleeve which at one end is mounted 65 in fixed and concentric relation to the sinker

cams and is rotationally supported in relation to the needle cylinder and sinker ring by bearing means confined to that end portion of the needle cylinder at which the sinker cams are located (for example, by a bearing in the sinker ring), which sleeve extends within the cylinder from the sinker cams to beyond the end of the cylinder remote from the sinker ring, centralising means beyond said end of the cylinder in a stationary part of the machine for centralising the sleeve relatively to the needle cylinder and mechanism beyond said end of the cylinder for controlling the angular relationship (about the cylinder axis) of the sleeve and the sinker cams to the needle cams and for permitting and determining limited rotational movement of the sleeve and cams in relation to the needle cams as the cylinder reverses its direction of rotation.

2. A machine according to Claim 1, in which the centralising means is constituted by a centralising aperture, through which the sleeve extends, in a stationary member disposed beyond that end of the needle cylinder which is remote from the sinker ring.

3. A machine according to either of the preceding claims comprising a throat ring on which the sinker cams are carried and having the said sleeve attached to the throat ring.

4. A machine according to Claim 3 wherein the said sleeve is provided with an inner clamping sleeve extending through it for clamping it to the throat ring.

5. A machine according to Claim 4 wherein the clamping sleeve has a screw threaded engagement with the throat ring and engages with an internal flange on the first mentioned sleeve to clamp the latter to the throat ring.

6. A machine according to any of the preceding claims having a supporting sleeve on which the sinker ring is carried and which is arranged to rotate with the needle cylinder, and adjusting means for varying the position of the supporting sleeve axially of the cylinder to vary the setting of the sinker ring and sinker cams in relation to the cylinder.

7. A machine according to Claim 6 wherein the said adjusting means is mounted to rotate with the needle cylinder.

8. A machine according to Claim 6 or Claim 7 wherein the said adjusting means is constituted by an adjustable screw abutment arranged to engage the end of the supporting sleeve which is remote from the sinker ring.

9. In a circular knitting machine of the type specified the provision of a sinker cam mounting assembly comprising an axially adjustable mounting for the sinker ring, a mounting for the sinker cams extending within the sinker ring and a sleeve extend-

- ing from the sinker cam mounting and supported and centralised thereby, which sleeve extends within the needle cylinder from the sinker cam mounting to beyond the end of the cylinder remote from the sinker ring and co-operates with centralising means beyond said end of the cylinder and with controlling mechanism as specified in Claim 1.
10. An arrangement as claimed in Claim 9 comprising a throat ring forming the mounting for the sinker cams and a clamping sleeve engageable with the throat ring to secure the first mentioned sleeve thereto which clamping sleeve extends through the first mentioned sleeve.
11. A circular knitting machine of the

type specified having the sinker cams mounted substantially as hereinbefore described with reference to Figures 1-4 of the drawings accompanying the Provisional Specification or Figure 5 of the accompanying drawings.

12. In a circular knitting machine of the type specified a sinker cam mounting assembly constructed and arranged substantially as hereinbefore described with reference to Figures 1-4 of the drawings accompanying the Provisional Specification or Figure 5 of the accompanying drawings.

ERIC POTTER & CLARKSON,
Chartered Patent Agents.

PROVISIONAL SPECIFICATION.

Improvements in Circular Knitting Machines.

30 We, THE BENTLEY ENGINEERING COMPANY LIMITED, of Komet Works, New Bridge Street, Leicester, a British Company, do hereby declare this invention to be described in the following statement:—

35 This invention concerns circular knitting machines of the type having a rotatable and oscillatable needle cylinder, inside sinkers (i.e. sinkers mounted and controlled inside the needle circle) mounted in a sinker ring 40 inside the needle cylinder, and sinker operating cams inside the sinker ring. The invention is primarily concerned with machines of this type having two opposed needle cylinders equipped with double ended 45 needles capable of transfer from one cylinder to the other by means of sliders for the purpose of changing over from the production of rib fabric to plain fabric and for the purpose of altering the character of the 50 rib fabric. In general such machines have cylinders disposed one above the other to rotate and oscillate about a common vertical axis, and those machines which are sold under the Registered Trade Mark 55 "KOMET" are an example to which this invention is applicable.

In superimposed needle cylinder machines of the type specified the sinkers are usually carried in a grooved or tricked ring so as to be capable of projection between the needles to the outside of the needle circle to engage the yarn and of retraction to draw the yarn inwardly so as to assist in the loop formation and so as to hold down the loops as the needles rise. The cams necessary to give the sinkers their movement, and the sinker ring, are usually mounted on a sleeve which extends downwards through the bottom needle cylinder and rests on a fixed part of the machine below the needle cylinder and the cylinder-driving mechanism.

Mechanism is usually provided on a fixed part for adjusting the sleeve vertically so that the height of the sinkers may be set to a nicety. The fixed part also usually carries stop mechanism for locating the sleeve circumferentially in relation to the needle cylinder and for adjusting the timing of the sinker movements in relation to the needle movements. This mechanism usually incorporates two opposed stops between which a suitable part on the sleeve is disposed so that during rotation of the needle cylinder the sleeve is positioned by one stop, and as the needle cylinder reverses its direction of movement during "reciprocating" knitting the sleeve is moved over from one stop to the other. The sinker cams are keyed to the sleeve and the sinker ring is keyed to the needle cylinder so that the sinkers are carried around the stationary sinker cams. Usually two plain journal bearings are provided between the rotatable and oscillatable needle cylinder and the relatively stationary sleeve, one just below the sinker ring and one near the lower end of the needle cylinder. These serve to hold the sleeve concentrically with the needle cylinder and for many years have been a source of trouble in knitting machines of the type under discussion because they are difficult to lubricate. In particular the lower bearing is liable to become dry and in some cases rusty and if this happens seizure occurs.

A number of proposals have been made for overcoming this difficulty and some of them have been concerned with manual or automatic lubricating devices for the bearings. Because of the extreme inaccessibility of the bearings such lubrication systems have not achieved practical success. Other proposals have involved the use of anti-friction bearings such as ball or roller bearings, re-

quiring no lubrication over a long period. A disadvantage of such proposals is that owing to the very restricted space available to accommodate a bearing of this kind the section of the bearing is necessarily very small in relation to its diameter so that the bearings have had to be specially made and are extremely fragile.

The present invention seeks to overcome difficulties discussed above and it provides a circular knitting machine of the type specified, characterised by the combination of a sleeve, supported and centralised by the sinker cams or a part to which they are connected, having a bearing in the sinker ring or in a member in the immediate vicinity of the sinker ring (e.g. a member connected direct to the sinker ring) which sleeve extends within the cylinder from the cams to beyond the end of the cylinder remote from the sinker ring, centralising means beyond said end of the cylinder for centralising the sleeve in a stationary part of the machine, and stop mechanism beyond said end of the cylinder for controlling the angular relationship of the sleeve and the sinker cams to the cylinder and for determining and permitting limited rotational movement of the sleeve and cams in relation to the cylinder as the latter reverses. It will therefore be seen that there is only one bearing, viz. that between the cams or a part to which they are connected and the sinker ring or a member in the immediate vicinity of the sinker ring. This bearing, being disposed in the vicinity of the open end of the needle cylinder, can readily be lubricated. The centralising means does not serve as a bearing in the normal accepted sense of that word, for relative movement between the sleeve and this centralising means only takes place at the time that the needle cylinder reverses its swing during reciprocating knitting.

The foregoing and other features of the invention are incorporated in the construction which will now be described by way of example with reference to the accompanying drawings in which:—

Figure 1 is a sectional elevation through relevant parts of knitting machine;

Figure 2 is the elevation thereof looking from the left of Figure 1;

Figure 3 is an underneath view of the needle cylinder and associated parts; while

Figure 4 is a perspective view of one part of the mechanism.

In Figure 1 there is shown a needle cylinder 1, attached to a base 2 rotatably mounted by means of a thrust bearing 3 and a journal bearing 4 in a stationary part 5 of the frame of the knitting machine. This cylinder 1 may be the lower cylinder of a superimposed needle cylinder machine. It is driven in the usual manner by means of a bevel gear 6 attached to the base 2 and

meshing with a bevel gear 7. Inside the top end of the needle cylinder 1 there is a sinker ring 8 which is keyed to it at 9 for up and down adjustment and has its inner periphery of part-circular sectional form. This sinker ring 8 is cut with a part-circular tracks 10 in which curved inside sinkers 11 of known form slide, and the sinkers are operated by cams in a cam ring 12, the said cams providing a track 13 for the sinkers butts 14.

The cams 12 are attached to a throat ring 29 and have a bearing on the internal periphery of the sinker ring 8, their exterior periphery being of part-circular sectional form to match the shape of the sinker ring. They are prevented from rotating with the needle cylinder 1 by the following mechanism. Secured to the cam ring 12 there is a sleeve 15 which extends down inside the needle cylinder 1 and is spaced interiorly from it. The lower end of this sleeve 15 protrudes through a suitable aperture in a stationary member 16 attached to the part 5 so that the sleeve is centralised, and this member 16 carries lugs, 17, 18, provided with opposed adjustable stop screws 19, 20, between which a tongue 21 on the sleeve is disposed. It will therefore be appreciated that during rotation of the needle cylinder 1, tongue 21 is positioned by one of the stop screws 19, 20 so that the angular relationship of the sleeve 15 and the sinker cams 12 to the needle cylinder 1 is determined. This relationship determines the timing of the sinker movements in relation to the needle movements and it may be adjusted by adjusting the stop screw just mentioned. During reciprocatory knitting the needle cylinder oscillates to and fro. At each reversal of motion of the needle cylinder, the drag between the sinker ring 8 and the sinker cams 12 and also the drag exercised on these cams by the sinker butts 14, tends to cause the sleeve 5 to move with the cylinder. The slight drag between the stationary centralising part 16 and the base of the sleeve 15 does not prevent this movement of the sleeve 15, which movement is terminated by one of the stop screws 19, 20. Thus throughout 105 reciprocating knitting the tongue 21 moves to and fro or "shogs" between the screws 19, 20.

The sleeve 15 may be suspended from the sinker cams 12 in any suitable manner. In the illustrated construction an internal flange 22 at its upper end is locked between said cams and an inner sleeve 23 which is screwed on to the lower end of the throat sleeve 15. This inner sleeve 23 is itself 125 locked against unscrewing by grub screws 24 shown in Figure 3.

The sinker ring 8 together with the sinkers 11, sinker cams 12 and sleeves 15 and 23 is adjustable up and down the needle cylin- 130

der 1 in order to regulate the height of the sinkers in relation to the top end of the needle cylinder. For this purpose the sinker ring 8 is supported on the top end of a sleeve 25 slidably mounted in the needle cylinder 1 and driven to rotate with it by means of a tongue 26 which fits like a key

in a slot 27 in the needle cylinder. This tongue 26 rests on an adjustment screw 28 which extends up through the cylinder base 10 2.

ERIC POTTER & CLARKSON,
Chartered Patent Agents.

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759,137

COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of
the Original on a reduced scale.*

FIG.5.

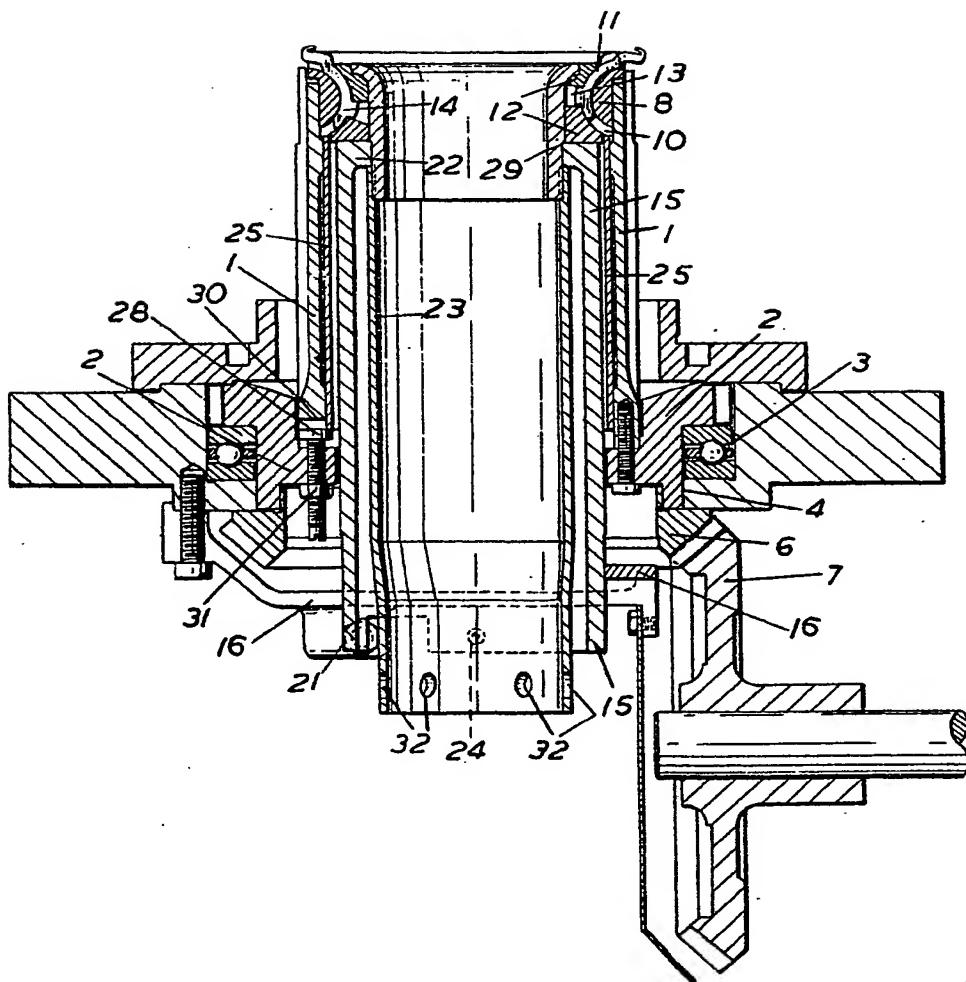
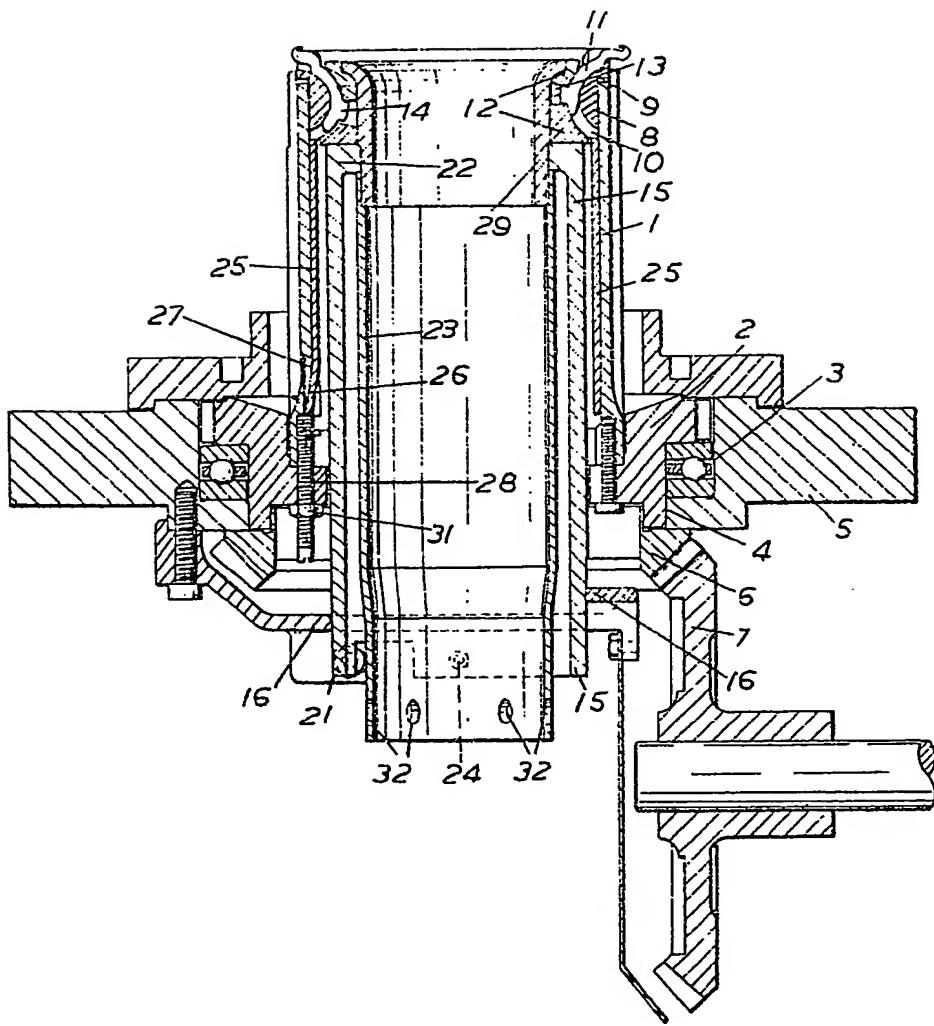


FIG. 1.

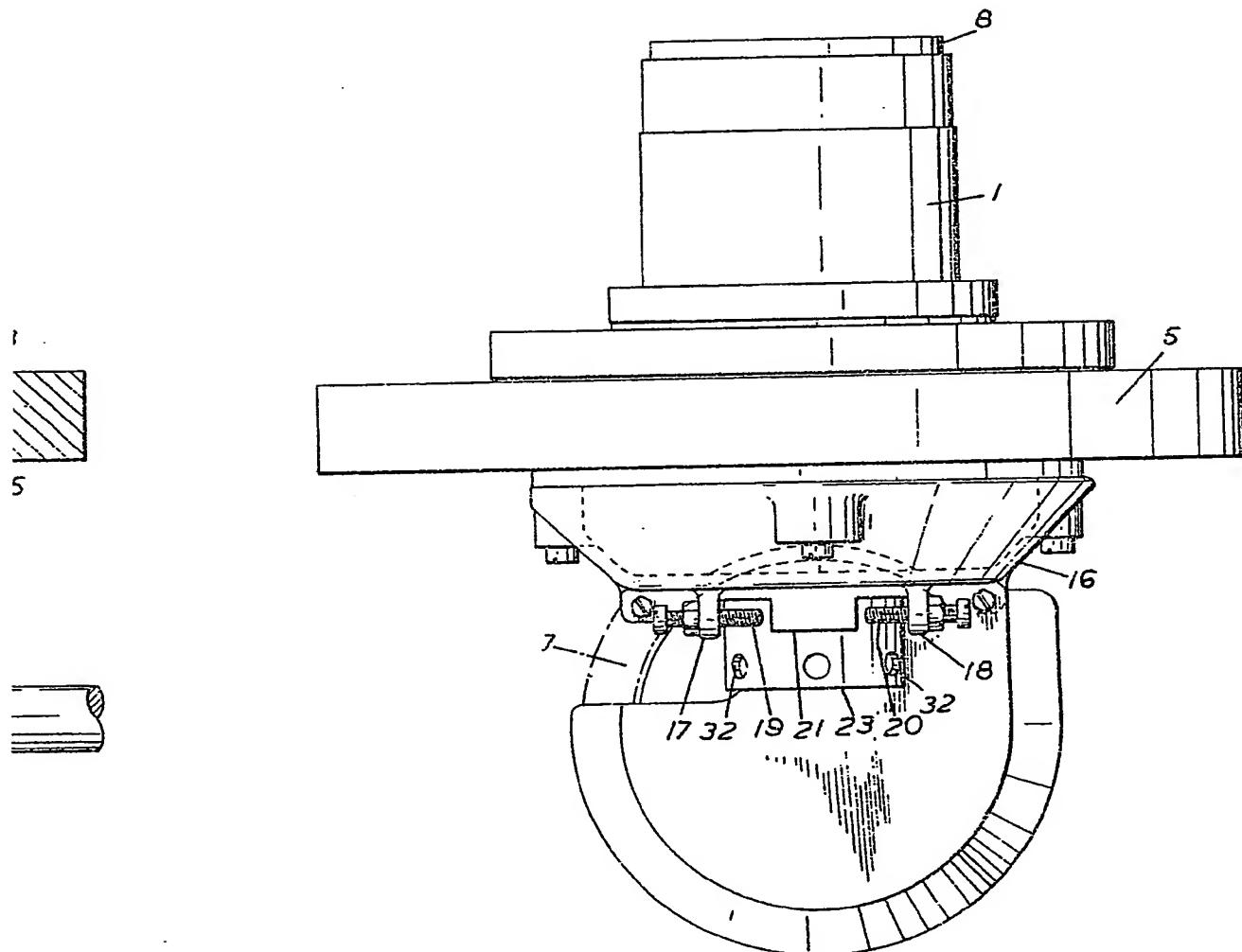


759,137 PROVISIONAL SPECIFICATION

3 SHEETS

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the Original on a reduced scale.
SHEETS 1 & 2

FIG. 2.



75S:37 PROVISIONAL SPECIFICATION
3 SHEETS This drawing is a reproduction of
the Original on a reduced scale.
SHEETS 1 & 2

FIG. 2.

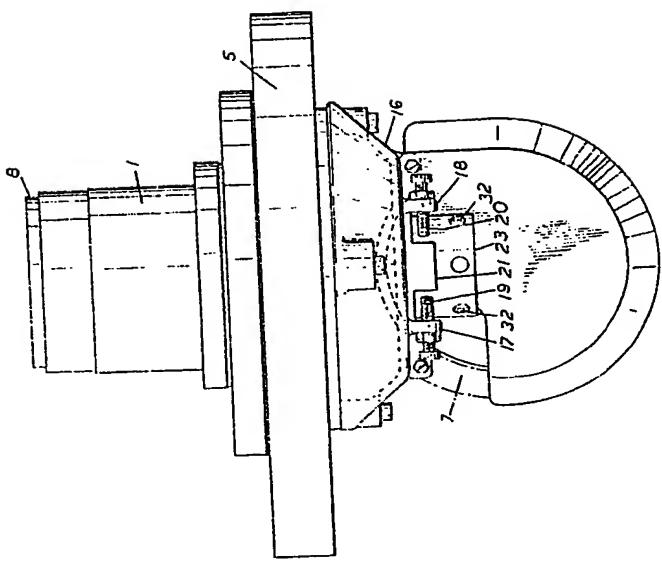
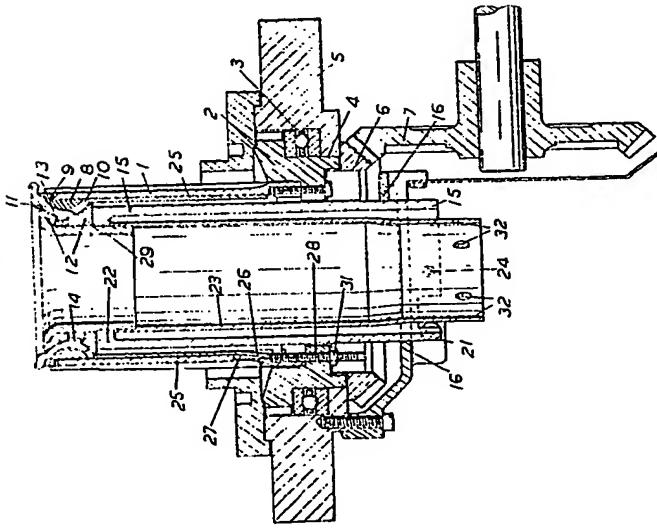


FIG. I.



759,137

PROVISIONAL SPECIFICATION

3 SHEETS

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SHEET 3

FIG. 3.

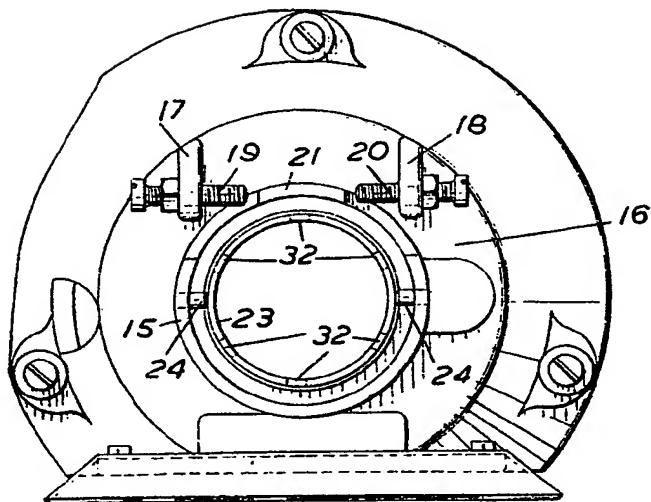


FIG. 4.

